Abstract

A Goddard Multi-Scale Modeling System with Unified Physics

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A multi-scale modeling system with unified physics has been developed at NASA Goddard Space Flight Center (GSFC). The system consists of an MMF, the coupled NASA Goddard finite-volume GCM (fvGCM) and Goddard Cumulus Ensemble model (GCE, a CRM); the state-of-the-art Weather Research and Forecasting model (WRF) and the stand alone GCE. These models can share the same microphysical schemes, radiation (including explicitly calculated cloud optical properties), and surface models that have been developed, improved and tested for different environments.

In this talk, I will present: (1) A brief review on GCE model and its applications on the impact of the aerosol on deep precipitation processes, (2) The Goddard MMF and the major difference between two existing MMFs (CSU MMF and Goddard MMF), and preliminary results (the comparison with traditional GCMs), and (3) A discussion on the Goddard WRF version (its developments and applications).

We are also performing the inline tracer calculation to comprehend the physical processes (i.e., boundary layer and each quadrant in the boundary layer) related to the development and structure of hurricanes and mesoscale convective systems. In addition, high - resolution (spatial. 2km, and temporal, 1 minute) visualization showing the model results will be presented.